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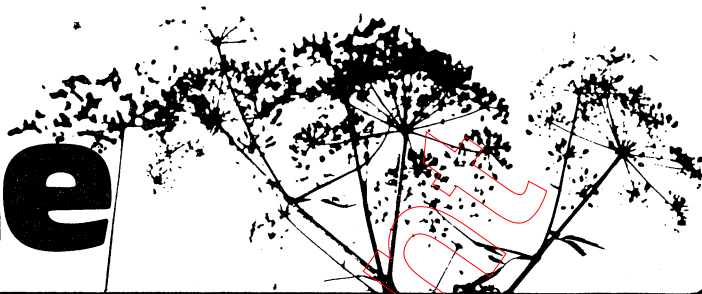
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Weed science



COOPERATIVE EXTENSION SERVICE • PURDUE UNIVERSITY • DEPARTMENT OF BOTANY AND PLANT PATHOLOGY
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DIAGNOSING HERBICIDE INJURY

T. N. Jordan, Extension Weed Specialist

When diagnosing herbicide injury, consider all possible causes including environmental and mechanical factors, as well as diseases and insects. Observe the condition of the whole plant. Also, look for the effectiveness of the herbicide on weeds in the treated area. Herbicide injury will usually occur in definite patterns within a field. Look for --

- 1) drift patterns across a field.
- 2) overapplied rates at the end of rows.
- 3) uniformly injured strips caused by application equipment.
- 4) differential injury across soil types (injury on light soils such as sandy knolls and/or lack of weed control on heavy soils such as in low spots in the field).

Primary Sites of Action and Injury of Some Commonly Used Herbicides

Most herbicides can be grouped according to their mode of action (the type of injury symptoms they express). By knowing a few characteristics of each group of herbicides, the injury caused in a particular field can be identified through a process of elimination. The specific herbicide may not be readily determined, but all herbicides that do not produce the characteristic injury symptoms can be eliminated. This leaves a much smaller group of herbicides to consider. By checking records of the fields in question or by determining what was applied in adjacent fields, the herbicide which caused the injury can usually be identified.

1) Photosynthetic Inhibitors

Action: These herbicides are most often applied to the soil and are absorbed by plant roots. The herbicide moves with the flow of water into the foliage by the xylem system (systemic) but does not translocate back down into the roots by the phloem system. When photosynthetic inhibitor herbicides are used postemergence, their action is contact and requires thorough wetting of the foliage, usually with the aid of an adjuvant. Injury occurs on leaves and above ground stems. No damage is caused to the root system. Plants must germinate and turn green before they die.

Injury: Plants turn yellow then die back from the bottom to the top. Leaves turn yellow between the veins then begin dying from the tip toward the base and from the outer edges toward the center.

Specific Herbicides: Atrazine, Bladex, Tenoran, Sinbar, Lorox, Princep, Milogard, Sencor/Lexon, Basagran.

2) Cell Growth Inhibitors

Action: Herbicides work on the germinating seedlings and stop growth of the roots and/or shoots before they emerge.

Injury: Symptoms may be expressed in the roots and/or shoots, but mostly in one or the other. Those herbicides that affect the root system usually do not cause any visible damage to the above ground stem other than stunting.

Root injury symptoms -- Injury may appear as root pruning and the inhibition of secondary roots. Roots may be swelled or club-shaped. The lower stems

of broadleaf plants will be thickened and shortened.

Specific Herbicides: Treflan, Tolban, Basalin, Cobex, Prowl, Surflan, CIPC.

Stem Injury Symptoms -- Corn stems appear twisted and leaves tightly rolled. Stems can become ruptured, with new growth protruding out of the ruptured tissue. Soybean leaves are dark green, crinkled, and/or leaf tips flattened. Leaves may fail to unfold from bud. Root damage may also occur.

Specific Herbicides: Lasso, Dual, Eptam, Sutan, Vernam, CIPC.

3) Growth Regulators

Action: Growth regulator herbicides can be taken up from the soil by the root system. However, most growth regulator herbicides are used as postemergence treatments. Thus, they cause more damage to the shoot system than to the already established root system.

Injury: Soil absorbed herbicides can cause both root and shoot injury. Usually, Banvel injury to soybean shoots is more severe than 2,4-D or 2,4-DB at equal rates. Both 2,4-D and Banvel cause plants to turn darker green than normal. In corn the brace roots will fuse together and the shoot will "buggy whip" (onion leaf).

Root Injury Symptoms -- A proliferation or clusters of short secondary roots are visible along the tap roots of soybeans. Growth of feeder roots on corn is inhibited. With Alanap, roots may turn upward, as if growing out of ground.

Specific Herbicides: 2,4-D, Banvel, Amiben, Alanap.

Shoot Injury -- 2,4-D and 2,4-DB cause bending and twisting of soybean stems. 2,4-D causes leaf strapping (feathering) of soybeans and brittle stems of corn. Banvel additionally causes new growth of soybean leaves to

cup upward. Dalapon will give many of the same symptoms as both cell growth inhibitors and growth regulators. It will cause the plant tissue to become dark green, and, in soybeans, the leaf damage will look similar to Banvel injury.

Specific Herbicides: 2,4-D, Banvel, 2,4-DB.

4) Cell and Membrane Disruptors

This herbicide class consists mostly of postemergence nonselective contact herbicides. Newer products are soil-applied and tend to be selective in soybeans. Injury symptoms include desiccation of leaf tissue (leaf burn) caused by disruption of cell membranes. Thorough coverage of foliage is needed for complete weed control. Toxicity increases with high temperatures and direct sunlight. Incomplete coverage or spray drift can cause spots of dead leaf tissue which may be confused with plant diseases.

When applied to the soil, these herbicides destroy the membranes of germinating seeds. Heavy rains can cause splash of treated soil onto leaves of crop plants causing injury (Modown), or the herbicide can volatilize off wet soils and cause crop injury (Premerge). Modown injury increases under cool, wet conditions. Stem burn at the soil line may occur. Late injury from Modown may appear as leaf crinkling similar to Lasso and Dual injury. Plant injury symptoms from Goal are similar to Modown.

Specific Herbicides: Paraquat, Premerge, Modown, Goal, Blazer.

5) Unclassified Herbicides (Mode of action not known)

Roundup -- a nonselective, foliar herbicide with no soil activity. Translocation is enhanced under environmental conditions conducive to good plant growth. A slow acting herbicide. Plants will turn brown and slowly die.